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ENGINEER DEPARTMENT, U. S. ARMY.

REPORT

UPON

UNITED STATES GEOGRAPHICAL SURVEYS

WEST OF THE ONE HUNDREDTH MERIDIAN,

IN CHARGE OF

FIRST LIEUT. GEO. M. WHEELER,

CORPS OF ENGINEERS, U. S. ARMY,

UNDER THE DIRECTION OF

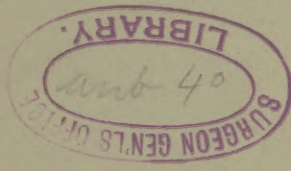
BRIG. GEN. A. A. HUMPHREYS,

CHIEF OF ENGINEERS, U. S. ARMY.

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U. S. GEOGRAPHICAL SURVEYS WEST OF THE ONE HUNDREDTH MERIDIAN.
1ST LIEUT. GEO. M. WHEELER, CORPS OF ENGINEERS, U. S. ARMY, IN CHARGE.

REPORTS

UPON

ARCHÆOLOGICAL AND ETHNOLOGICAL COLLECTIONS FROM VICINITY OF
SANTA BARBARA, CALIFORNIA, AND FROM RUINED PUEBLOS OF
ARIZONA AND NEW MEXICO, AND CERTAIN INTERIOR TRIBES.

BY

FREDERICK W. PUTNAM,

CURATOR OF THE PEABODY MUSEUM, CAMBRIDGE, MASS.,

ASSISTED BY

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AND LUCIEN CARR, ASSISTANT CURATOR PEABODY MUSEUM.



WITH APPENDIX OF INDIAN VOCABULARIES,

REVISED AND PREPARED BY ALBERT S. GATSCHET.

IN TWO PARTS, WITH TWO APPENDIXES.

ILLUSTRATED BY A FRONTISPIECE, SKETCH, 20 PLATES, AND 135 TEXT CUTS.

OBSERVATIONS ON THE CRANIA FROM THE SANTA BARBARA ISLANDS, CALIFORNIA.

BY LUCIEN CARR,

Assistant Curator Peabody Museum American Archaeology and Ethnology.



THE series of Crania from the Santa Barbara Islands numbers about three hundred and fifteen specimens,* and is divided somewhat unequally between the Peabody Museum of Archæology at Cambridge, Mass., and the Army Medical Museum at Washington City. In the former of these institutions there are over one hundred and thirty skulls representing Santa Cruz of the northern, and San Clemente and Santa Catalina of the southern, group of islands, while in the latter and larger collection are to be found numerous specimens from the mainland, from San Nicolas of the southern and San Miguel of the northern group of islands, as well as from Santa Cruz. Thus it will be seen that, to a certain extent, these collections supplement each other; and although it is with the former that I shall chiefly have to deal, yet, thanks to the publications of the Army Medical Museum and to the personal kindness of its curator, Assistant Surgeon George A. Otis, U. S. A., there is abundant material for a comparison of the results arrived at by a careful study of the crania from each one of these different localities. To simplify this as much as possible and at the same time to make future reference comparatively easy, the average measurements are here reproduced and tabulated, not only according to the place from which the crania were originally obtained, but also according to the collection in which they are now to be found.

* This estimate is limited strictly to adults from the islands. In it the specimens in the Army Medical Museum are put down at one hundred and eighty-two, though, in point of fact, they largely exceed that number. My estimate was taken from the Check-list published in 1876, since which time that collection, including the crania found on the mainland, has probably been doubled.

TABLE I.—MEAN MEASUREMENTS OF CRANIA FROM THE SANTA BARBARA ISLANDS, CALIFORNIA.*

Number.	Locality.	Number of specimens.	Capacity.	Length.	Breadth.	Height.	Index of breadth.	Index of height.	Frontal.	Depository.
1	Santa Cruz.—Males.....	73	1,302	177	140	134	.789	.750	.....	Army Medical Museum.
2	Females.....	62	1,175	170	135	128	.791	.752	.....	Do.
3	San Miguel.—Males.....	18	1,318	176	140	131	.794	.738	.....	Do.
4	Females.....	18	1,246	172	137	128	.805	.747	.....	Do.
5	San Nicolas.—Males.....	7	1,326	181	137	132	.760	.730	.....	Do.
6	Females.....	4	1,253	173	140	124	.808	.718	.....	Do.
7	Santa Cruz.—Males.....	45	1,365	178	138	132	.776	.741	.90	Peabody Museum.
8	Females.....	35	1,219	172	134	128	.778	.748	.86	Do.
9	San Catalina.—Males.....	26	1,470	189	133	130	.704	.690	.95	Do.
10	Females.....	12	1,279	178	130	124	.729	.696	.92	Do.
11	San Clemente.—Males.....	9	1,452	186	137	131	.740	.702	.94	Do.
12	Females.....	6	1,315	179	135	125	.754	.706	.90	Do.
13	Average of males.....	178	1,372	181	137	131	.760	.725	.93	
14	Average of females.....	137	1,248	174	135	126	.777	.727	.89	
15	Average of the whole.....	.....	1,310	177	136	128	.768	.726	.91	
	Maximum.....	315	1,747	195	154	145	.....	.....	1.05	
	Minimum.....	.....	990	157	122	116	.....	.....	.80	
	Range.....	.....	757	38	32	29	.....	.....	.25	

* These measurements are given as follows: Capacity in cubic centimetres; length, breadth, and height in millimetres.

Historically speaking, there is but little that can be learned about the people who formerly inhabited these islands, and with whose skulls we have been making somewhat familiar. In the brief summary that Mr. Putnam has elsewhere given, this coast is shown to have been occupied by numerous tribes, living in different villages, speaking different languages, or different and scarcely intelligible dialects of the same language, and closely resembling, in these respects at least, the Indians of the Atlantic seaboard at the date of the first settlements in Virginia and New England. This, with now and then a small and imperfect vocabulary, comprises the sum and substance of all that the early chroniclers have told us about these people for the two centuries immediately succeeding the discovery of this country by the Spaniards, and it is so very meagre and unsatisfactory that we turn, with a certain sense of relief, to the study of their crania and of the other contents of their tombs in the hope that some further light may be thrown upon a subject that otherwise must forever remain shrouded in darkness. But while this revelation of the spade and pickaxe—infal-

lible so far as it goes—enables us to reproduce truly the phase of civilization to which these people had attained, it does not aid us, except perhaps in a negative way, in forming a correct opinion as to the precise period of time at which they lived and flourished. Indeed, so far as the evidence of the graves is concerned, there is no reason for assigning a very great antiquity to any of these remains.

Among the crania themselves there is, of course, nothing to indicate that they represent different phases of civilization; and the implements and ornaments of native manufacture, found buried with glass beads, brass rings, cannon-balls, and other articles of European origin, do not differ, either in degree or kind, from those taken from graves in which there is no such evidence of intercourse with the whites. As the one class of interments undoubtedly belongs to the people inhabiting these islands subsequent to the Spanish conquest, there can certainly be no good reason why the other should not be assigned to the same people, though, of course, it is possible, and even probable, that, taken together, they cover a period of time of long duration. Indeed there can be but little doubt of this, in view of the decayed condition of many of the skulls—so much so that their removal was impossible—and of the fact that the articles of European workmanship were found in graves of a comparatively late date. How long these people were in possession of these islands before the coming of the Spaniards, we can never know; but we do know that, be that period long or short, so far as the testimony of the graves is concerned, there was, from first to last, no advance in any of the arts by which we are wont to estimate the progress of a people in civilization. Bearing these facts in mind, we shall be better prepared to examine some of the points in which these crania are found to agree or disagree among themselves and with those from the mainland, and thus, perhaps, to arrive at a more correct understanding of the ethnology of this section of the Pacific coast.

Assuming, for the present, unity of race in the people formerly inhabiting these islands, and dividing the skulls according to the features that distinguish the sexes, it will be seen that there are one hundred and seventy-eight that are probably those of adult males and one hundred and thirty-seven of adult females. The average capacity of the former is 1,372^{cc}, and

of the latter 1,248^{cc}, showing a difference of 124^{cc} in favor of the males. The largest skull in the collection—Peabody Museum No. 13550, from San Clemente Island—has an internal capacity of 1,747^{cc}; while the smallest*—Army Medical Museum No. 1327, from Santa Cruz—is less than two-thirds of that size, reaching only to 990^{cc}. Of the whole number there are sixteen that range above 1,500^{cc}, and fifteen that fall below 1,100^{cc}. The mean of the whole, or, more properly, the mean of the averages from the islands, is 1,310^{cc}, which is less than that of the American Indian, 1,376^{cc}, as given by Dr. J. Aitken Meigs,† the Tennessee Moundbuilder, 1,341^{cc},‡ the Eskimos of Greenland,§ 1,392^{cc} and of the Northwest coast,|| 1,404^{cc}; but is somewhat larger than the ancient Peruvian,¶ 1,230^{cc}, and the Australian,** 1,224^{cc}. Proceeding a step further in our classification, we find that the index of breadth†† is .768, and of height, .726, which brings the entire collection within the class of orthocephali‡‡ and of platycephali; *i. e.*, the average cranium is neither long nor short, but occupies the middle position between the two, and its breadth is greater than its height. These resemblances and differences, however, can be seen to better advantage when the measurements are brought together in tabular form, and, to this end, I have arranged the following table, which may be found

* Check-list, Army Medical Museum, p. 49, Washington, 1876.

† Catalogue of Human Crania in the Collection of the Academy of Natural Sciences of Philadelphia, by J. Aitken Meigs, p. 10.

‡ Eleventh Annual Report of the Peabody Museum of Cambridge, p. 224. Jones' Aboriginal Remains of Tennessee, p. 110, Washington, 1876.

§ Check-list of the Army Medical Museum, Washington, 1876.

|| Check-list of the Army Medical Museum, Washington, 1876.

¶ Fourth Annual Report of the Peabody Museum, p. 18, Cambridge, 1871. Dr. J. Aitken Meigs, *l. c.*, p. 17, Philadelphia, 1857.

** The Native Races of the Pacific Ocean; a paper read before the Royal Institution of Great Britain, by Prof. W. H. Flower, of the Royal College of Surgeons of England. In this connection it may be well to say that, in measuring the internal capacity, Professor Flower used mustard seed, the Army Medical Museum, No. 8 shot, and the Peabody Museum, selected pease. To any one familiar with the discrepancies in the results obtained by using these different methods of measurement, it is needless to say that absolute accuracy cannot be claimed for either one of them, though all three can be made to approximate sufficiently close to the truth for purposes of comparison, especially when taken in connection with the length, breadth, and height.

†† The index of breadth = $\frac{\text{breadth} \times 1000}{\text{length}}$. Substituting the height for the breadth and the same

formula will give the index of height.

‡‡ I adopt the classification of Dr. Thurnam and other English authorities:

I Dolichocephali, or long skulls with index at or below .739.

II. Orthocephali, or oval skulls with index from .740 to .799.

III. Brachycephali, or broad skulls with index at or above .800.

not wholly devoid of interest, though it is not claimed to be of any great value as the basis for an inductive argument. It is limited, as will be seen, to crania from North and South America, and, as far as possible, the distinction based upon sex has been kept up. This, however, has not always been possible, as in some instances the records from which I have copied have made no difference in this particular, but have massed the two sexes together and given the mean measurements conjointly instead of separately. Where this is the case the comparison is to be instituted with the mean of the whole number of crania, as given in No. 15, Table I, or it may be omitted altogether without any very great sacrifice of craniometrical lore; but in all other instances males are to be compared with males and females with females. By pursuing this latter method, approximately accurate results may be obtained.

TABLE II—MEAN MEASUREMENTS OF CRANIA.*

Number.	Locality.	Number of specimens.	Capacity.	Length.	Breadth.	Height.	Index of breadth.	Index of height.	Frontal.	Remarks.
1	Santa Barbara.—Males	178	1,372	181	137	131	.760	.725	.93	Islands.
2	Females	137	1,248	174	135	126	.777	.727	.89	Do.
3	Total Santa Barbara	315	1,310	177	136	128	.769	.726	.91	Do.
4	Santa Barbara.—Males	46	1,285	175	138	133	.777	.754	.....	Mainland.
5	Females	40	1,195	170	135	129	.793	.762	.....	Do.
6	San Luis Obispo Bay.—Males	10	1,288	174	139	133	.789	.761	.....	Do.
7	Females	6	1,137	160	140	130	.863	.807	.....	Do.
8	Navajo.—Males	17	1,428	174	141	137	.817	.786		
9	Females	5	1,348	170	142	132	.839	.781		
10	Apache.—Males	19	1,355	170	146	132	.861	.776		
11	Females	10	1,267	166	140	123	.847	.742		
12	Greenland Eskimo.—Males	55	1,433	186	132	141	.710	.755		
13	Females	21	1,275	180	127	133	.709	.741		
14	Alaskan Eskimo.—Males	31	1,449	177	148	131	.835	.743		
15	Females	10	1,281	170	141	127	.836	.747		
16	Pah Ute (Shoshonee).—Males	13	1,323	178	136	128	.771	.720		
17	Females	3	1,212	175	136	127	.773	.725		
18	Huron.—Males	39	.....	187	139	139	.743	.743		
19	Females	18	.....	179	132	131	.757	.731		
20	Tennessee Mounds.—Males	43	1,401	164	146	145	.891	.886	.95	Flattened posteriorly.
21	Females	34	1,301	159	142	140	.893	.871	.90	Do.
22	Peruvian.—Mixed	50	1,204	155	143	126	.924	.814	.92	Do.
23	Algonquin, Canada.—Mixed	32	.....	184	141	136	.766	.739		
24	Algonquin, New England.—Mixed	30	.....	179	136	136	.759	.759		

* In this table, Nos. 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17 are taken from the Check-list of the Army Medical Museum. Nos. 18, 19, 23, 24 are taken from Prehistoric Man by Dr. Daniel Wilson, London, 1876. Nos. 20, 21, 22 are from the records of the Peabody Museum, and are not intended for comparison save in those measurements that have not been affected by the posterior flattening to which the crania have been subjected, such as capacity, width of frontal, and, later on, the facial measurements.

Up to this point in the effort to assign the typical skull from these islands to its proper class the averages of the two collections of Washington and Cambridge have been taken. In what follows, however, owing to a difference in the methods of measurement employed, my observations must be limited to the collection in the Museum at Cambridge. Fortunately this is quite large, and as the crania from the islands, as well as from the mainland, now in the Army Medical Museum, agree very closely, both in shape and size, with those now held in Cambridge from the same group of islands, it is safe to assert that the conclusions drawn from a study of the one collection will apply with equal force to the other. Supplementing, then, the results heretofore obtained from a consideration of the two series by the additional measurements taken of the specimens in Cambridge alone, and continuing the process of classification, it will be seen that the mean breadth of frontal,* at the narrowest point on the temporal ridge, is 91^{mm}. This is a little less than that of the Peruvian from the coast,† though the average capacity of the skulls now under consideration is greater. Its deficiency in this quarter, as well as in breadth, seems to be more than compensated by the increased development of the occipital portion of the head. In one hundred and twenty-two out of one hundred and fifty-one specimens examined, or 81 per cent., the distance between the temporal and frontal bones, measured along the line of the spheno-parietal suture, was found to be more than half a centimetre, thus forming what Dr. Broca calls the *Ptéreon in H*, which, according to the same high authority, is the normal condition in European skulls. In thirteen it was less than half a centimetre; in one the two bones were in contact, and in fifteen there were small, extra ("epipteric") bones in the upper part of the great wing of the sphenoid. Turning now to those peculiar conditions that strike the eye, but of which no measurement can give us a correct idea, we find that in fourteen of these crania wormian bones were developed in the lambdoidal

* In the Eleventh Annual Report of the Peabody Museum, p. 368, the mean frontal diameter of one hundred and three "crania from Santa Barbara" is put down at 98^{mm}. This was a clerical error, as the diameter is much less. Information received since the publication of that report assigns most of these crania to Santa Cruz Island, and in Table No. I they will be found correctly placed and the measurements accurately given.

† Average of Tables II, III, IV, V, VI, and VII, in Fourth Annual Report of the Peabody Museum, p. 14 *et seq.*

suture, five of them being in the form of epactals or "Inca" bones. In two the interparietal suture was still open, and in three, or 2 per cent., metopism, or persistence of the frontal suture, was present. Among Europeans this latter peculiarity is stated to exist in one in seven, or a little over 14 per cent.

In thirty-five, or 23 per cent., of these skulls, there is evidence of posterior flattening, due without doubt to cradle-board pressure, though in no case was it sufficient to interfere with the accuracy of our measurements. As a rule, it is limited to a slight flattening of the parietals at the obelion, much as if a small slice had been taken off the skull at that point. Rarely, if ever, does it extend down as far as the inion, though the lambda is not unfrequently included. Sometimes one or even two, and in one instance three, small depressions were found on this flattened surface. These may have been caused by some unevenness in the wad or pillow upon which the child's head rested. In only four specimens (and in these it was so slight as scarcely to exceed the limits allowed in cases that merely show a marked want of symmetry) was found that form of occipital flattening so common among the Moundbuilders' skulls, in which one or the other of the parietals is pushed forward and the whole of the posterior portion of the head is forced out of shape. In three of these it was the right parietal that had been so deformed. This was probably accidental, though it is worthy of remark that in a large majority of the crania from the mounds in Tennessee that have been so flattened, it is the same side of the head that has suffered. In a hundred of these, taken at random and including males and females, it was found that fifty had the right parietal so distorted, twenty-eight the left, while in twenty-two the skull was either normal or the pressure had been so evenly applied as not to cause any perceptible difference. In one case two crania taken from the same grave* were found to be distorted to about the same extent, though on opposite sides. This is believed to be decisive of the point so far as the Moundbuilders are concerned, and it is hardly probable that any special significance should have been attached by the Santa Barbara Indians to the results of a process that is shown to have been accidental among the people among whom the practice was far more common.

* Peabody Museum, Nos. 17281 and 17282.

The great difference in the position and extent of this flattening, as seen in these two peoples, is believed to have been caused by the character of the board on which the baby was strapped, and possibly it may also have been influenced by the length of time during which the child was so confined. A solid board, to which a child is strapped, neck and heels, affords but little room for growth or expansion in any part of the body with which it comes in contact, while on the contrary a frame-work of twigs,* such as is sometimes used, even now, by the squaws, as a bottom to their cradles, furnishes just as little resistance to the growth of the child. In the one case the back of the head, pressing upon a hard, inelastic substance, is absolutely prevented from attaining its full development in that particular direction, while in the other, its growth is more or less interfered with, it is true, though to nothing like the same extent. Both of these forms of cradle are to be found to-day among the Indians of Arizona and the California coast, the former being in general use near military posts and in other quarters where planks or boards suitable for the purpose can be easily obtained. Among the wild Indians, however, or those situated at some distance from the white settlements, and beyond their influence, the latter or aboriginal form is still preserved† in much the same shape in which it probably existed among the people whose crania I am now considering. Separating these crania according to the islands from which they were obtained, this process or custom does not seem to have been confined to any one of them in particular. The dolichocephali of Santa Catalina practised it as extensively as the orthocephali and brachycephali of Santa Cruz, though among neither was the deformation so general or so great as among the Moundbuilders and Peruvians.

Thus far my observations have been confined to the calvaria alone, and the measurements are believed to be sufficient to give a correct idea of their outlines and dimensions, with some of their individual peculiarities. The facial measurements are now to be considered‡; and as they are regarded as of much importance in indicating racial characters, I have pre-

* A Pah Ute cradle now in the Peabody Museum, No. 12112.

† Dr. E. Palmer is authority for this statement.

‡ These and other measurements of the crania in the Peabody Museum were taken by Miss Jennie Smith, assistant.

pared a table of them, and, for the sake of comparison, have included the same measurements upon a series of crania from the mounds of Tennessee.

TABLE III.—FACIAL MEASUREMENTS.

Number.	Locality.	Number of specimens.	Prognathic index.	Orbital index.	Nasal index.	Length of face.	Zygomatic diameter.
1	Santa Cruz.—Males.....	45	101	91	49	69	135
2	Females.....	35	101	93	49	65	126
3	Santa Catalina.—Males.....	26	99	93	49	73	135
4	Females.....	12	99	95	53	70	127
5	San Clemente.—Males.....	9	97	92	47	71	135
6	Females.....	6	97	93	47	68	128
7	Tennessee Mounds.—Males.....	43	98	90	50	74	139
8	Females.....	34	98	92	51	69	129
9	Average from Santa Barbara Islands.—Males.....	80	99	92	48	71	135
10	Females.....	53	99	93	49	67	127
11	Total average from Santa Barbara Islands.....	133	99	93	49	69	131
12	Total average from Tennessee Mounds.....	77	98	91	50	71	134

By reference to the above table it will be seen that the average length of face* in our typical skull is 69^{mm}, and that the zygomatic diameter amounts to 131^{mm}, in both of which respects it is somewhat smaller than the average Mound skull. The gnathic index† is found to be 99, the nasal‡ 49, and the orbital§ 93, or, translating these numerical expressions into their scientific equivalents, that the face is mesognathic, mesorhine, and megaseme.||

Summing up these results and adding those peculiarities that are apparent to the sight, but of which the calipers cannot take cognizance, we find

* Measured from the centre of the nasal suture (*Nasion*) to the alveolar point.

† If the index is between 98 and 102, the face is mesognathous; if below 98, orthognathous; if above 102, prognathous. In a very well-formed English skull the gnathic index is as low as 92.—*Flower, Native Races of the Pacific Ocean*.

‡ The general mean of all races is given by Broca as 50. Those skulls in which the index varies between 48 and 52 are said to be mesorhine; if below 48, leptorhine, or narrow-nosed; if above 53, platyrhine, or broad-nosed.—*Recherche sur l'Indice nasal, Revue d'Anthropologie*, Tome I, 1872.

§ The general average of all races is given by Broca as 86, or mesoseme; if above 89 the skull is megaseme, or has a large open orbit; if below 83, it is microseme, or has a low orbit.

|| These terms are some among the valuable contributions of Broca to science. For a full account of these contributions and of the methods of arriving at the facial indices, etc., see *Mémoires de la Société d'Anthropologie de Paris, Revue d'Anthropologie*, and *Bulletins de la Société d'Anthropologie de Paris*, etc., in which these papers have at different times been published.

that the typical or average skull of this collection is small and low and of medium length as compared with its breadth; that it has a retreating forehead, a prominent occiput, and is slightly scaphocephalic or roof-shaped along the sagittal suture. Its chief development is in the occipital region; so much so, indeed, that a plane perpendicular to the horizon drawn through the auricular openings would divide the skull into two unequal parts, of which the posterior portion would be much the larger. The face is small and narrow, even as compared with the Peruvians. It is more prognathic than the white man, though it by no means reaches the extreme in that respect. The nasal opening is of medium size, while the orbit is large. The malar bones are broad and slope back from the median line of the face, differing widely in this respect as also in the prominence of the nasal bones from the Greenland Eskimo, whose face is flat.

Tried by any craniometrical standard, this cannot be said to be a high order of skull; but if judged by the contents of their graves, this people, except in their ignorance of the manufacture of pottery, had reached a phase of development equal to anything found on the eastern slope of the continent. Certainly their work in chipped and polished stone and in shell is not surpassed by anything yet revealed by the mounds; while their large stone mortars (portable mills), and their steatite *ollas* and *comalis* used for cooking purposes, indicate an advance in the domestic arts that, so far as is yet known, is peculiarly their own.*

Compared with the other collections of crania in Table II, it will be found that in the indices of breadth and height this skull approaches somewhat closely the Pah Ute and what Dr. Wilson calls the Algonquin (Canada) type, though smaller than the latter in every way, when its measurements of length, breadth, and height are considered absolutely and not relatively. From the broad, high, square head of the Moundbuilder, with its rounded, dome-like crest, it is separated by an impassable barrier. Between the Eskimo of the Northwest coast and those from Greenland, considered solely with reference to the index of breadth, it occupies a medium position, though

* See introductory chapter by Mr. Putnam, pages 17, 18, for the reasons for placing the Californians in the "lower status of barbarism," notwithstanding their want of knowledge of the potter's art. Also, pages 14 and 273 in relation to the absence of pottery.

its relations with the former are, perhaps, closer and more clearly defined. It is true the one skull is decidedly orthocephalous while the other is brachycephalous, and that in the entire lot of three hundred and fifteen crania from the islands only $4\frac{1}{2}$ per cent. reach the very moderate grade of brachycephalism of the typical Alaskan, and under these circumstances it does seem like straining a point to claim that any resemblance at all exists between them; still, as a matter of fact, there are individual crania in this collection with an index even higher than that of the Alaskan; and, from the most dolichocephalous to the opposite extreme, they shade into each other by a series of almost imperceptible gradations. With the typical cranium of the Greenland Eskimo, Nos. 12 and 13, Table II, however, the differences are of a more radical character, as, besides being smaller in every way, the one skull is platycephalous, or broader than it is high, and the other strongly hypsicephalous, or higher than it is broad. These conditions seem to be very general in the two collections, as out of the seventy-six Eskimo crania there are eight, or 11 per cent., in which the breadth is greater than the height, while of the three hundred and fifteen crania from the California Islands, there are but eighteen, or 7 per cent., in which it is *not* so. In the facial bones, too, especially those of the nose and cheek, these skulls are found to differ as essentially as in the size and form of the calvaria. In view of these fundamental differences it is impossible to assign these crania to one and the same class, even if our comparison be limited to the dolichocephali from Santa Catalina; and for the same reasons, so far as they relate to the indices of height and breadth, the same remark will apply *a fortiori* to the *averages* of the two branches of the Eskimo, as given in Nos. 12, 13, 14, and 15, Table II. That they indicate a difference in species, using this term in the sense in which it is usually employed in Zoölogy, it would be premature to affirm, as the range of individual variation, even among peoples of a presumably pure race, is found to be very great, and affords a convenient alternative to any one desiring to escape this conclusion. That they do, however, represent a very marked differentiation—call it species, race, variety, or what you will—is believed to be beyond cavil; and this may be admitted, be it understood, without carrying with it the full acceptance of the polygenistic theory. The uniformity with which the Greenland

Eskimo, the Algonquins of Canada, the Moundbuilders of the Cumberland Valley, and the Peruvians from the coast adhere to their respective and widely differing types is decisive upon this point; for while it is undeniably true that in a collection composed exclusively of either kind of these crania there will usually be found a percentage, be it great or small, of skulls that differ from the "typical" form, yet it is equally true that, after making all due allowance for the range of individual variation, the one form will be found to be so overwhelmingly predominant that the presence of any other at once suggests an intruder or gives good reason for doubting its authenticity.

Upon this point it is probable that a study of the present collection may throw some light; at all events a comparison of the series from the different islands with each other will show how sharply marked are these differences, and within what narrow geographical limits they sometimes occur. Taking the collections from the islands, and those from Santa Barbara and San Luis Obispo Bay—stations on the mainland—as a whole, and it will be found to be, as stated above, decidedly orthocephalic; but if the specimens be divided according to the cephalic index there will result fifty-five dolichocephali, two hundred and nineteen orthocephali, and one hundred and twenty-four brachycephali, as in the following table:

TABLE IV.

Number.	Locality.	Dolichocephali.	Orthocephali.	Brachycephali.
1	Santa Cruz	7	53	17
2	Santa Catalina	31	8	0
3	San Clemente	6	9	0
4	Santa Cruz	5	75	54
5	San Miguel	0	17	16
6	San Nicolas	1	6	4
7	Santa Barbara, mainland	4	44	26
8	San Luis Obispo Bay	1	7	7
		55	219	124

Examined with reference to the individual variation, and it will be found that the cephalic index ranges from .654, Peabody Museum, No.

14249, from Santa Catalina, to .890,* Army Medical Museum, No. 1351, from Santa Cruz. This is certainly a wide gap to be bridged over, and yet so closely are these skulls connected with each other that if the space separating them be measured by intervals of 10 each, there are skulls in the Cambridge collection alone that will cover each one of the intervening steps. Regarded from this point of view, it would be difficult, if not impossible, to draw any line of distinction between these crania, and say that here one race ends and another begins; but if we proceed a step farther and subdivide these skulls according to the islands from which they were obtained, we shall find other factors entering into the calculation that cannot be explained save on the hypothesis that different races occupied these two groups of islands at the time represented by this collection. Take, for instance, San Miguel of the northern group and Santa Catalina of the southern—extreme cases, it is true, but all the better for my purpose. In the collection from the former of these islands there are sixteen brachycephalous and seventeen orthocephalous crania—not a single dolichocephalous specimen among them; while in the latter there are thirty-one dolichocephali and eight orthocephali, but no brachycephali. Eliminating the orthocephali as common to both, and we have in one case sixteen short skulls against thirty-one that are long in the other. This condition of affairs is not reconcilable with the theory of a difference in cranial forms among people of the same race. If it were, then we ought to find on each of these islands crania belonging to the opposite class; *i. e.*, among the dolichocephali there ought to be some brachycephali, and *vice versa*. Especially would this be the inference in view of the fact that on each of these islands we do find orthocephalic skulls, a form that is supposed to have resulted from an admixture of the other two, and also because on Santa Cruz and the other islands *the three forms are found*, but in different proportions. If, on the other hand, it be admitted that a difference in the form of the head indicates a difference in race, then the presence on these two islands of one distinctive form of cranium to the exclusion of its opposite takes its place at once as a fact in the natural order of events. So, also, in those cases in

*There is one cranium with an index of .901 from the mainland; but I prefer to confine my figures to the collection from the islands.

which the two extremes of crania are found together, or in which their coexistence is a legitimate inference, the presence of the stranger is explicable on the theory of adoption or intermarriage, or by any of the other customs by which the Indians in other portions of the country were in the habit of recruiting their ranks. The third form, orthocephalic, or intermediate would then follow as a result of the union of the two extremes. Plausible as is this explanation, it acquires additional force from the fact that it accords with the historical account of the existence of numerous tribes along this coast, speaking different languages, as given in all of the early chronicles, and especially since this account is confirmed by the philological researches of Mr. Albert S. Gatschet,* who shows that the people formerly living on the mainland opposite Santa Cruz, spoke a different language from those living immediately to the south, just opposite the southern group of islands. Basing his conclusions upon the very incomplete vocabularies that have come down to us from the Spanish Fathers, and also upon the more recent and satisfactory researches of Dr. Horatio Hale of the United States Exploring Expedition, and of Dr. Oscar Loew, he calls one of these tongues the "Santa Barbara" (a dialect of which was also spoken on Santa Cruz of the northern group of islands), and the other he claims as a dialect of the widely-extended Shoshonee stock of languages. With this conclusion I certainly do not take issue, for though it does not by any means definitely settle the question as to what language was originally spoken on Santa Catalina Island, yet it does show that the language in use on the mainland, opposite, differed from that spoken by the Santa Barbara Indians, who lived on the same shore, immediately to the north, opposite Santa Cruz. As the people on this island spoke the same language as those on the mainland just opposite, it is not improbable, to say the least, that the inhabitants of the southern islands spoke the same language as the people living on the coast opposite them, and therefore differing from that spoken on the northern islands.

Thus it will be seen that these lines of argument reënforce each other, and the difference of race between the people inhabiting these two groups of islands, rendered probable by a study of the languages, is made com-

* Annual Report of the Geographical Surveys west of the 100th meridian, Lieut. George M. Wheeler, U. S. Army, in charge, p. 330. Washington, 1876. See also map in Contributions to American Ethnology, Vol. III, in which the same linguistic distribution is adopted. Washington, 1877.

paratively certain by the presence of the two different forms of crania under the peculiar circumstances under which they are shown to have existed.

While admitting fully this conclusion, and believing that the original inhabitants of Santa Catalina were of a different race from those of Santa Cruz, I do not wish to be understood as asserting that they were of the same race or spoke the same language as the people living on the mainland opposite. Indeed, the evidence of the crania is decidedly opposed to this view, and in this respect there is a very marked difference between the people found on the two groups of islands. Between the crania found on Santa Cruz Island, and those from Santa Barbara on the mainland (Nos. 1, 2, 7, and 8, Table I, and Nos. 4 and 5, Table II) there is little or no difference. Practically they are of one and the same form, and belong to a series that may be styled orthocephalic, with a very strong infusion of brachycephalism. This is as it should be among peoples shown by their idioms to belong, probably, to the same race. But between the crania from Santa Catalina and those from the mainland there is no such uniformity. The one skull, as has been shown, is decidedly dolichocephalous; and while it is impossible to say what the typical form of the Shoshonee skull may eventually turn out to be, yet so far as now known it is decidedly orthocephalic (Nos. 16 and 17, Table II),* and differs but little, if at all, from the average cranium of the northern group of islands. This difference in form marks a break in the line of argument that connects the inhabitants of Santa Catalina with the Shoshonees of the mainland, and while it increases the doubt as to whether these two peoples spoke the same language, it does not affect the conclusion as to the difference of race between the inhabitants of the two groups of islands. In other words, the question is not, who were the people of Santa Catalina, and what language they spoke, but, were they of the same race and did they speak the same language as the inhabitants of Santa Cruz?

Granting, then, the existence of two different races on these two groups of islands, and the question at once arises as to which of the two is the more ancient. Upon this point nothing is known historically, and we are therefore reduced to a study of the crania for a solution of the problem. In themselves, as has been said, they do not help us, but in so far as they indicate relation-

* The Pah Ute are classed as "Shoshoni" on the Map showing the Distribution of the Indian Tribes of California, to illustrate Reports of Stephen Powers, esq. Washington, 1877.

ship with the tribes from the mainland they throw a flood of light upon the matter. Referring again to Table II, it will be noticed that there is a great similarity between the collections of crania from the northern group of islands and those from the mainland. Especially is this noticeable in the case of the Pah Ute, a member of the great Shoshonee family. All are orthocephalic or of a low grade of brachycephalism; and this form, so far as known, prevails up and down the coast, and as far inland as the hunting-grounds of the Apache and the Navajo. Nowhere except on two of the southern group of islands, and on them in differing proportions, do we find the dolichocephali in such numbers as to justify the conclusion that they were ever the prevailing race. Everywhere else they are, when found at all, in such limited numbers as to give the impression that they were the survivors of a people in course of rapid extinction rather than the precursors of an incoming race of conquerors. Even the prevalence of the orthocephalic type of skull, on the northern group of islands, and its presence in such large proportion on the Santa Catalina group, where the dolichocephalic type so distinctly prevails, taken in connection with the powerful leaven of brachycephalism and the small percentage of dolichocephalism on the mainland, speaks of battle and defeat and the wholesale appropriation of women by the victors. Read in the light of history, we probably have here the story of a contest in which the original dolichocephalic possessors of the soil were worsted by their brachycephalic invaders and driven back, somewhat as the Basques were in Northwest Spain, until they were finally circumscribed within the narrow limits of San Clemente and Santa Catalina, with nothing but the broad expanse of the ocean between them and the Hawaiian Islands, hundreds of miles away. Here, unable to retreat farther, shut in between "the devil and the deep sea," they were found at the time the Spaniards overran California, and here they lingered—a miserable remnant—until about the beginning of the present century, when they were removed to the mainland by the Catholic Fathers and collected around the different Missions. In this new home and with their mode of life changed they were soon reduced to a condition of peonage in which conquerors and conquered alike became the "hewers of wood and drawers of water" to a superior people.

